

# Traumatic proximal tibiofibular dislocation with neurovascular injury

Lokesh A Veerappa, Chetan Gopalakrishna

## ABSTRACT

23 years old male presented with inferolateral dislocation of proximal tibiofibular joint associated with popliteal artery and common peroneal nerve injury. The extension of the injury to involve the interosseus membrane up to the distal tibiofibular joint. The association of popliteal artery injury is not reported before to the best of our knowledge.

**Key words:** Common peroneal nerve palsy, interosseus membrane, popliteal artery injury, proximal tibiofibular joint

## INTRODUCTION

Traumatic proximal tibiofibular dislocation is often unrecognized or misdiagnosed at the initial presentation and is a potential source of chronic morbidity.<sup>1-4</sup> The superior, anterolateral, and posteromedial dislocation, either isolated or associated with a fracture of the tibia or exceptionally with an ankle fracture, is described. Anterolateral dislocation is the most frequent variety and often associated with ligamentous injury and peroneal nerve palsy. Superior dislocation is very rare.<sup>5</sup> We report a case of inferolateral dislocation of the proximal tibiofibular joint, associated with popliteal artery transection and common peroneal nerve palsy. The associated vascular injury has not been previously reported. The peculiarity of the injury is that the disruption is extending down the interosseus membrane to the distal tibiofibular joint, homologous to the Essex Lopresti disruption in the forearm.

hour following road traffic accident. He was riding a two wheeler and was knocked down by a truck, leading to fall on the left knee in flexion. It was followed by immediate onset of pain in his left knee and leg. He had diffuse swelling, and tenderness of the left knee and leg. On examination he had lateral prominence of the fibular head with absent dorsalis pedis and posterior tibial artery pulsations. There was no capillary filling and the limb was cold to touch. Crepitus and tenderness was felt in midleg laterally. Clinically, he also had foot drop and loss of sensation in the areas supplied by the superficial and deep peroneal nerves, suggestive of common peroneal nerve palsy. The sensorimotor component of the tibial nerve appeared intact. There was varus instability of the knee.

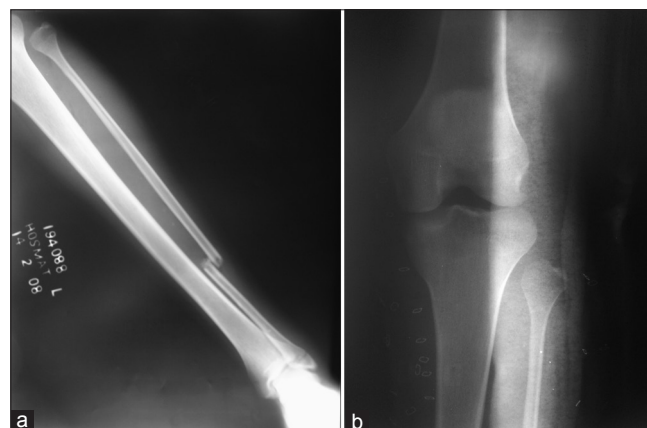
Plain radiographs of the knee, leg, and ankle [Figure 1a, b] showed diastasis of the proximal tibiofibular joint, with the head of fibula being displaced inferiorly and laterally with

## CASE REPORT

A 23-year-old male reported to the emergency services 1

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**Figure 1:** (a) Anteroposterior X-ray showing the disruption of the proximal tibiofibular joint and the fracture of fibular shaft. Note the overlap of the fibular fragments with a downward displacement of the fibular head in relation to the tibial condyle. (b) Anteroposterior radiograph of the knee showing disruption of the proximal tibiofibular joint

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the fracture of the shaft of the fibula and an overlap of the fractured fragments, further corroborating the inferior displacement of the fibular head. The arterial Doppler scan revealed the complete transection of the artery 2 cm proximal to the bifurcation. The artery was repaired using an interposition graft of saphenous vein with double incision fasciotomy of the leg. The limb was placed in an above knee slab in 15° of knee flexion. Subsequently, split skin grafting of the fasciotomy wounds was performed after 5 days.

Magnetic resonance imaging (MRI) of the left knee performed 2 days after the injury [Figure 2a–c] showed complete disruption of the lateral collateral ligament and the proximal tibiofibular joint. The medial collateral ligament and the anterior and posterior cruciate ligaments were intact. The attachment of the biceps tendon was intact. There was extension of the proximal tibiofibular joint disruption involving the interosseous membrane and also causing a sprain of the anterior ligament of the distal tibiofibular syndesmosis at the ankle.

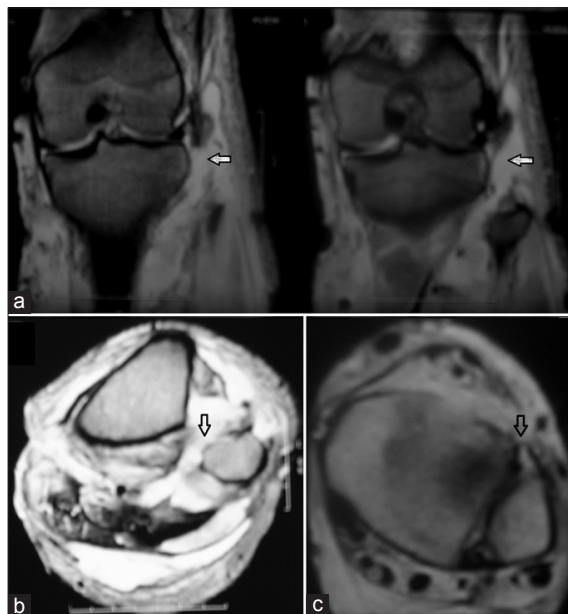
Delayed proximal tibiofibular syndesmosis was operated 2 weeks after the injury because the fasciotomy wound had exposed the area adjacent to the planned internal fixation of the proximal tibiofibular joint. Open reduction and stabilization with a cancellous screw [Figure 3a, b] was performed with screw purchase of three cortices. The lateral collateral ligament injury was compensated by doing a biceps tenodesis. The proximal shift of the inferiorly displaced fibular head was achieved by doing

the biceps tenodesis. On life size X-rays, the apex of the fibula was proximally shifted in comparison to the lateral tibial plateau 7 mm postoperatively. Postoperatively, he was advised active range of motion exercises after 3 weeks and non-weight-bearing mobilization for 6 weeks. At 3 months followup, he had painless full range of motion of the left knee, was walking unaided without instability, and at 18 months, common peroneal palsy had completely recovered. There was no mediolateral laxity. Presently, 3½ years after injury, the patient is able to comfortably pursue all his day-to-day activities.

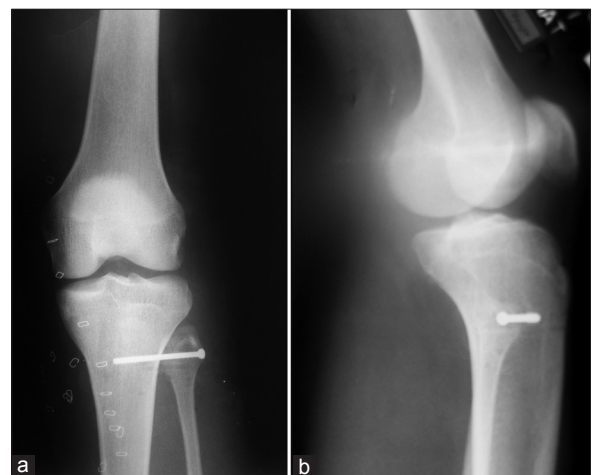
## DISCUSSION

The proximal tibiofibular joint is the articulation between the fibula head and the inferior surface of the lateral condyle of the tibia. It is surrounded by a fibrous capsule and broad anterior and posterior ligaments. The joint is reinforced anteriorly by the biceps femoris tendon, inserting into the fibula head. Posteriorly, the popliteus tendon reinforces it. Additional support is gained from the fibular collateral ligament superiorly and inferiorly by the interosseous ligament. The joint is intimately associated with the common peroneal nerve, moving forward from the popliteal fossa around the fibula head.<sup>6</sup> The proximal tibiofibular joint is an inherently stable joint due to good ligamentous support. This is especially true when the knee is in extension, as the joint is protected by the surrounding ligaments. Typically, dislocation occurs when the knee is held in flexion and the foot is rotated and plantar flexed.<sup>7</sup>

Four injury patterns have been described by Ogden.<sup>5</sup> Subluxation (Type I) occurs in preadolescent girls and is usually atraumatic. Anterolateral dislocation (Type II) is the commonest injury pattern, accounting for 85% of



**Figure 2:** MRI of (Lt) knee showing (a) Complete disruption of the proximal tibiofibular ligament and the lateral collateral ligament. (White arrows) (b) Disruption of the interosseus ligament. (c) Sprain of the anterior tibiofibular ligament of the distal syndesmosis. (Arrow) Note the slackness of the ligament and edema



**Figure 3:** X-ray of the knee joint anteroposterior (a) and lateral (b) views showing fixation of proximal tibiofibular joint with a 3.5 mm cancellous lag screw

dislocations. It is usually described after a fall, with the knee flexed, the ankle inverted, and foot plantar flexed. Posteromedial dislocation (Type III) occurs in 10%. The mechanism is usually direct trauma, such as a blow from the bumper of a car. This is associated with a transient common peroneal nerve injury. Superior dislocation (Type IV) occurs in approximately 2% and is most often associated with common peroneal injury and usually caused by high-energy ankle injuries.<sup>5</sup>

We consider the mechanism of current injury to be that of shearing force on the fibula in relation to the tibia resulting in the inferior translation of the fibular head. This accounts for the disruption of the interosseus membrane and the anterior part of the distal tibiofibular ligament. This has again led to the stretching of the peroneal nerve which is relatively fixed at the neck of fibula. The fracture of the fibular shaft can be attributed to the force dissipated by the shear stress restrained by the incomplete disruption of the distal syndesmosis. However, the reason for the vascular injury is still inconspicuous. It could be because of the relative fixity of the vessels at the region of the proximal tibia where it lies in very close relation to the interosseus membrane which has been disrupted here.

The diagnosis of proximal tibiofibular joint dislocation is essentially a clinical one, requiring a high level of suspicion. It should be considered in any patient presenting with lateral knee pain and difficulty in weight bearing, who has a consistent history. Because of the nature of the presentation, it is commonly mistaken for a meniscal injury. The findings on examination may be quite subtle and are easily missed. On physical examination, there is often surprisingly free movement of the knee joint and no effusion. Clinical features may include lateral knee pain aggravated by pressure over the fibular head, limited knee extension, crepitus, visual deformity, and locking or popping. Ankle movement may exacerbate knee pain. There may be transient peroneal nerve palsy, especially with posterior or superior dislocations.<sup>8</sup> There is usually proximal tenderness over the fibula, and in the case of anterior dislocation, an anterolateral prominence of the fibula head.

Plain radiology is generally unhelpful, with the abnormalities only apparent on comparison with a post-reduction film or on a comparison view of the other knee. The principal abnormality is lateral displacement on the anteroposterior view and either slight anterior or posterior displacement on the lateral view. Magnetic resonance imaging or a computed tomography is vital for diagnosis because of the poor utility of the plain radiograph.<sup>7</sup>

The management of type I and II injuries is reduction by anteroposterior pressure over the fibula head, with the knee

slightly flexed and the ankle everted. Reduction of type III and IV injuries is more difficult and may require open reduction and fixation.<sup>1,2,5,9</sup> Open reduction and internal fixation is the option available in the delayed treatment of the injury if associated injuries demand aggressive management.

There is no literature to suggest that proximal tibiofibular joint disruption can lead to vascular injury. So, the fixation of the same was not planned at the initial instance. However, the vascular repair was supported with a slab immediately after the vascular repair. Even after the MRI, the only injuries were disruption of the proximal tibiofibular joint, disruption of the lateral collateral ligament, interosseus membrane disruption, and the distal anterior tibiofibular ligament injury. So, the slab was continued. The purpose of fixing the screw for the fibular head was that literature showed that unstable proximal tibiofibular joint can lead to chronic pain and instability. We waited for the fasciotomy wounds to heal before fixing the proximal tibiofibular joint as they were close to it. The lateral collateral ligament disruption has been compensated by biceps tenodesis.

The concept of three cortical purchase of the screw is debatable. Three cortex purchase was done to allow toggle of the screw when the patient bears weight to prevent breakage of the screw. This is similar to the three cortex purchase taken during distal syndesmotomic injuries about the ankle, which is being used to avoid screw removal.<sup>10,11</sup>

Prognostically, untreated proximal tibiofibular disruption is known to cause long term difficulties in terms of pain, gait disturbance, and active sporting activities.<sup>1,2</sup> Therefore, it is prudent to detect it and fix it at the earliest for optimal healing.

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